

REMARKS

Claims 1-3, 5-13, 15-19 and 22 are pending in the application. Favorable reconsideration is respectfully requested in light of the following Remarks.

The Office action rejects Claims 1-3, 5-8, 15, 17-19 and 22 under 35 U.S.C. 103(a) over Zitzler (“Comparison of Multiobjective Evolutionary Algorithms: Empirical Results”, hereinafter “Zitzler”), and Claims 9-13 under 35 U.S.C. 103(a) over Zitzler in view of Hauskrecht (“Linear Program Approximations for Factored Continuous-State Markov Decision Processes, hereinafter “Hauskrecht”). The rejections are respectfully traversed.

Independent Claim 1 specifies, *inter alia*, a method for multi-objective portfolio optimization for use in investment decisions based on competing objectives and a plurality of constraints constituting a portfolio problem, the method comprising:

generating an initial population of solutions of portfolio allocations in a computing device to substantially cover a portfolio configuration space having a plurality of dimensions defined by the competing objectives and the plurality of constraints;

performing a first multi-objective process based on the initial population and the competing objectives to generate a first interim efficient frontier in a portfolio performance space having at least three dimensions;

performing a second multi-objective process based on the initial population and the competing objectives to generate a second interim efficient frontier in the portfolio performance space; and

fusing the first interim efficient frontier with the second interim efficient frontier to create a fused efficient frontier for use in investment decisions. (Emphasis added).

Independent Claim 17 specifies, *inter alia*, a system for multi-objective portfolio optimization for use in investment decisions based on competing objectives and a plurality of constraints constituting a portfolio problem, the system comprising:

a population generation portion that generates an initial population of solutions of portfolio allocations, the population generation portion systematically generating the initial population of solutions to substantially cover a portfolio configuration space having a plurality of dimensions defined by the competing objectives, the population generation portion including a range value generation portion for varying values of the competing objectives over a range of each competing objective, and a linear program portion for solving a linear program, for each of the linear constraints, multiple times by setting a weight vector equal to one of the linear constraints and a randomly generated vector;

an efficient frontier generation portion including a first processing portion for performing a first multi-objective process based on the initial population and the competing objectives to generate a first interim efficient frontier in the portfolio performance space having at least three dimensions, and a second processing portion for performing a second multi-objective process based on the initial population and the competing objectives to generate a second interim efficient frontier in the portfolio performance space; and

a fusion portion for fusing the first interim efficient frontier with the second interim efficient frontier to create a fused efficient frontier for use in investment decisions. (Emphasis added).

Independent Claim 22 specifies, *inter alia*, a computer readable medium for multi-objective portfolio optimization for use in investment decisions based on competing objectives and a plurality of constraints constituting a portfolio problem, the computer readable medium comprising:

a population generation portion for generating an initial population of solutions of portfolio allocations in a computing device to substantially cover a portfolio configuration space having a plurality of dimensions defined by the competing objectives and the plurality of constraints;

an efficient frontier portion for performing a first multi-objective process based on the initial population and the competing objectives to generate a first interim efficient frontier in a portfolio performance space having at least three dimensions, and for performing a second multi-objective process based on the initial population and the

competing objectives to generate a second interim efficient frontier in the portfolio performance space; and

a fusion portion for fusing the first interim efficient frontier with the second interim efficient frontier to create a fused efficient frontier for use in investment decisions. (Emphasis added).

Zitzler discloses a comparison study of multiobjective evolutionary algorithms. Specifically, Zitzler compares eight algorithms with six test functions. See Section 6.1. The outcomes of the first five runs were unified, and then the dominated solutions were removed from the union set for each algorithm and test function. See Section 6.2 The results were plotted in Figures 1-6.

Applicant agrees with the Office action that the Zitzler reference does not explicitly teach that the competing objectives and plurality of constraints constitute a portfolio problem, and that the solution space has at least three dimensions. See *Page 3* of the final Office action.

However, Applicant asserts that Zitzler also fails to teach or suggest another fundamental difference between the claimed invention and the Zitzler reference. The claimed invention is directed to performing a first multi-objective process and a second multi-objective process to generate a first efficient frontier and a second efficient frontier, respectively, and fusing the first and second efficient frontiers to create a fused efficient frontier. See underlined portions of Claims 1, 17 and 22 above.

By contrast, Zitzler teaches unifying a plurality of runs and removing the dominated solutions from the union set for the same multi-objective process in order to compare the eight different multi-objective processes. In other words, the union set of Zitzler is created from the same multi-objective process, not first and second multi-objective processes as recited in the claimed invention. Thus, there is no mention in Zitzler of fusing the first and second efficient frontiers generated by the first and second multi-objective processes.

In addition, one skilled in the art would not be motivated to modify the Zitzler reference to meet the claimed invention because the Zitzler reference is directed to comparing the efficient frontiers from eight different multi-objective processes. To fuse the first and second efficient frontiers from different multi-objective processes would

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render the comparison study of Zitzler meaningless. The Hauskrecht reference adds nothing to overcome this shortcoming in Zitzler.

In view of the foregoing, Applicant asserts that the Office action fails to establish a *prima facie* case of obviousness, and the rejection of Claims 1-3, 5-13, 15-19 and 22 is unsupported by the art and should be withdrawn.

It is respectfully submitted that the application is in condition for allowance. Favorable consideration and prompt allowance of the application is earnestly solicited.

Should Examiner Wong believe anything further would be desirable in order to place the application in better condition for allowance, the Examiner is invited to contact the undersigned attorney at the telephone number listed below.

It is believed that any additional fees due with respect to this paper have already been identified. However, if any additional fees are required in connection with the filing of this paper, permission is given to charge account number 07-0868 in the name of General Electric Company.

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Respectfully submitted,

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